

Claims

[c1] What is claimed is:

1. A power source test instrument for a circuit comprising:

a voltage test circuit comprising:

a first operational amplifier with a positive input terminal connected to a voltage source;

a first set of relays with a first terminal connected to a negative input terminal of the first operational amplifier, a second terminal connected to an output terminal of the first operational amplifier, and a third terminal grounded via a first resistor;

a second set of relays with a first terminal connected to a third terminal of the first set of relays, a second terminal grounded, and a third terminal; and

a third set of relays with a first terminal connected to an output terminal of the first operational amplifier, a second terminal connected to a first output terminal of the voltage test circuit, a third terminal connected to the third terminal of the second set of relays, and a fourth terminal connected to a second output terminal of the voltage test circuit;

a current test circuit comprising:

a second operational amplifier with four resistors connected to form a differential amplifier, wherein the ratio of the resistance between a negative input terminal of the second operational amplifier and the output terminal of the second operational amplifier and the resistance between the negative input terminal of the second operational amplifier and a first input terminal of the differential amplifier, is equivalent to the ratio of the resistance between a ground terminal and a positive input terminal of the second operational amplifier and the resistance between the positive input terminal of the second operational amplifier and a second input terminal of the differential amplifier; and

a second resistor connected between the first input terminal and the second input terminal of the differential amplifier;

wherein the first set of relays can be switched to turn on the first terminal and the second terminal or to turn on the first terminal and the third terminal, the second set of relays can be switched to turn on the first terminal and the third terminal or to turn on the second terminal and the third terminal, the third set of relays can be switched to turn on the first terminal and the second terminal and to turn on the third terminal and the fourth terminal or be switched to turn on the first terminal and the fourth terminal and to turn on the second terminal

and the third terminal.

- [c2] 2.The test instrument of claim 1 wherein the positive input terminal of the first operational amplifier is connected to the voltage source via a variable resistor.
- [c3] 3.The test instrument of claim 1 wherein the negative input terminal of the first operational amplifier is connected to the first terminal of the first set of relays via a third resistor.
- [c4] 4.The test instrument of claim 1 wherein the resistance of the second resistor is a reciprocal of the ratio of the resistance between the negative input terminal and the output terminal of the second operational amplifier and the resistance between the negative input terminal of the second operational amplifier and the first input terminal of the differential amplifier.
- [c5] 5.The test instrument of claim 1 wherein the voltage source is a power management circuit used for providing a necessary voltage to the voltage test circuit and the current test circuit.
- [c6] 6.The test instrument of claim 1 further comprising at least one heat sink installed on the first operational amplifier and the second operational amplifier.

- [c7] 7.The test instrument of claim 6 further comprising a radiator to help the heat sink to radiate heat.
- [c8] 8.The test instrument of claim 1 further comprising a fuse connected to the voltage source for protecting the test instrument.
- [c9] 9.The test instrument of claim 1 wherein when the first terminal and the second terminal of the first set of relays are turned on, the second terminal and the third terminal of the second set of relays are turned on, the first terminal and the second terminal of the third set of relays are turned on, and the third terminal and the fourth terminal of the third set of relays are turned on, the voltage test circuit can be used as a dummy battery.
- [c10] 10.The test instrument of claim 1 wherein when the first terminal and the third terminal of the first set of relays are turned on, the first terminal and the third terminal of the second set of relays are turned on, the first terminal and the second terminal of the third set of relays are turned on, and the third terminal and the fourth terminal of the third set of relays are turned on, the voltage test circuit can be used as a charger.
- [c11] 11. The test instrument of claim 1 wherein when the first terminal and the third terminal of the first set of relays

are turned on, the first terminal and the third terminal of the second set of relays are turned on, the first terminal and the fourth terminal of the third set of relays are turned on, and the second terminal and the third terminal of the third set of relays are turned on, the voltage test circuit can be used as a discharger.